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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/898,259	07/03/2001	Eiji Nakashio	09792909-5083	1899

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EXAMINER	
MAGEE, CHRISTOPHER R	
ART UNIT	PAPER NUMBER
2653	8

DATE MAILED: 04/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/898,259	NAKASHIO ET AL.	
	Examiner	Art Unit	
	Christopher R. Magee	2653	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-8 and 10-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3, 5-8, 10 and 12* is/are rejected.

7)☒ Claim(s) *11 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 3, 5-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill (US 6,256,178) in view of Carey et al. (hereinafter Carey) (US 6,452,761 B1).

- Regarding claims 1 and 6, Gill shows a magnetic tunnel effect type magnetic head comprising:

a first soft magnetic conductive layer 80, which is to provide a lower shielding, layer;

a first nonmagnetic conductive layer 240, formed on the first soft magnetic conductive layer 80, to provide a lower gap layer.

a magnetic tunnel junction layer 230 formed on the first nonmagnetic conductive layer to provide a magnetic tunnel junction effect;

a second nonmagnetic conductive layer 225 formed on the magnetic tunnel junction layer 230 to provide an upper gap layer; and

a second soft magnetic conductive layer 82 formed on the second nonmagnetic conductive layer 225 to provide an upper shielding layer;

the spacer layer 235 of the lower gap layer is disposed beneath at least the magnetic tunnel junction layer (Figure 14).

Gill does not show a metal oxide layer formed on the first soft magnetic conductive layer and the metal oxide layer disposed beneath the magnetic tunnel junction layer.

On the other hand, Carey teaches that a metal oxide layer 33' that is made from oxidizing a portion or all of a metal layer (col. 2, lines 41-55; col. 5, lines 11-42) and is disposed on the magnetic shield layer 34, which is preferably a NiFe alloy layer or other soft magnetic material (col. 4, lines 52-60; Fig. 2B).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the magnetic head of Gill with a metal oxide layer as taught by Carey.

The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to provide the magnetic head of Gill with a metal oxide layer as taught by Carey in order to increase the areal density recording and readback capabilities of the sensor device (Carey; col. 2, lines 5-8).

- Regarding claims 2 and 7, Gill shows the metal oxide layer is of an aluminum oxide (col. 7, lines 6-11).

- Regarding claims 3 and 8, Gill shows all the features except a metal oxide layer having a thickness of over 10 nm and under a half a gap length.

Carey discloses the metal oxide layer has a thickness between 0.5 nm and 20 nm (5 angstroms to 200 angstroms) (col. 4, lines 52-60).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the magnetic head of Gill with the metal oxide layer thickness as taught by Carey.

The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to provide the magnetic head of Gill with the metal oxide layer thickness as taught by Carey so that the metal layer acts as a heat sink to dissipate and draw heat away from the sensor structure (Carey; col. 2, lines 17-23). Also, the claimed dimension falls within the range as recited by Carey. *In re Gardner*, 220 USPQ 2d 77 (Fed. Cir. 1984).

- Regarding claims 5 and 10, Gill shows the apparatus being of a yoke type in which the magnetic tunnel junction element is not exposed from a medium-opposite face (Figure 10).

3. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gill (US 6,256,178) and Carey et al. (hereinafter Carey) (US 6,452,761 B1), as applied to claims 1 and 6 above, and further in view of Sato (US 6,369,984 B1).

- Regarding claim 12, Gill and Carey disclose all the features, *supra*, except Gill and Carey do not disclose the surface of the metal oxide layer being mechanically and chemically polished to a smooth layer.

However, Sato teaches surfaces of various layers can be polished by so-called CMP (chemical and mechanical polishing) (col. 14, lines 25-30).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to polish the metal oxide layer of Gill and Carey with the CMP method as taught by Sato.

The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to polish the metal oxide layer of Gill and Carey with the CMP method as taught by Sato so that the layer can be smooth and free of pinholes, which will electrically short the junction between the layers.

Allowable Subject Matter

4. Claims 11 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

5. Applicant's arguments with respect to claims 1, 2, 5-7 and 10 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

a. Hosoe et al. (US 5,759,681) is cited to show a magnetic recording medium and magnetic recording system using the same.

b. Hsiao et al. (US 5,999,379) is cited to show a spin valve read head with plasma produced metal oxide insulation layer between lead and shield layers and method of making the same.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher R. Magee whose telephone number is (703) 605-4256. The examiner can normally be reached on M-F, 8: 00 am-5: 30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on (703) 305-6137. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christopher R. Magee
Patent Examiner
Art Unit 2653

March 23, 2004

GEORGE J. LETSCHER
PRIMARY EXAMINER